AN

INTERNSHIP REPORT

ON

IOT EARLY FLOOD DETECTION AND AVOIDANCE SYSTEM

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SYNOPSIS

"IoT Early Flood Detection & Avoidance System" is an intelligent system which keeps close watch over various natural factors to predict a flood, so we can embrace ourselves for caution, to minimize the damage caused by the flood. Natural disasters like a flood can be devastating leading to property damage and loss of lives. To eliminate or lessen the impacts of the flood, the system uses various natural factors to detect flood. The system has a wifi connectivity, thus it's collected data can be accessed from anywhere quite easily using IoT.

To detect a flood the system observes various natural factors, which includes humidity, temperature, water level and flow level. To collect data of mentioned natural factors the system consist of different sensors which collects data for individual parameters. For detecting changes in humidity and temperature the system has a DHT11 Digital Temperature Humidity Sensor. It is a advanced sensor module with consists of resistive humidity and temperature detection components. The water level is always under observation by a float sensor, which work by opening and closing circuits (dry contacts) as water levels rise and fall. It normally rest in the closed position, meaning the circuit is incomplete and no electricity is passing through the wires yet. Once the water level drops below a predetermined point, the circuit completes itself and sends electricity through the completed circuit to trigger an alarm. The flow sensor on the system keeps eye on the flow of water.

The water flow sensor consists of a plastic valve body, a water rotor, and a hall-effect sensor. When water flows through the rotor, rotor rolls. Its speed changes with different rate of flow. All the sensors are connected to Microcontroller, which processes and saves data. The system has wifi feature, which is useful to access the system and its data over IoT.

CONTENTS

1. INTRODUCTION

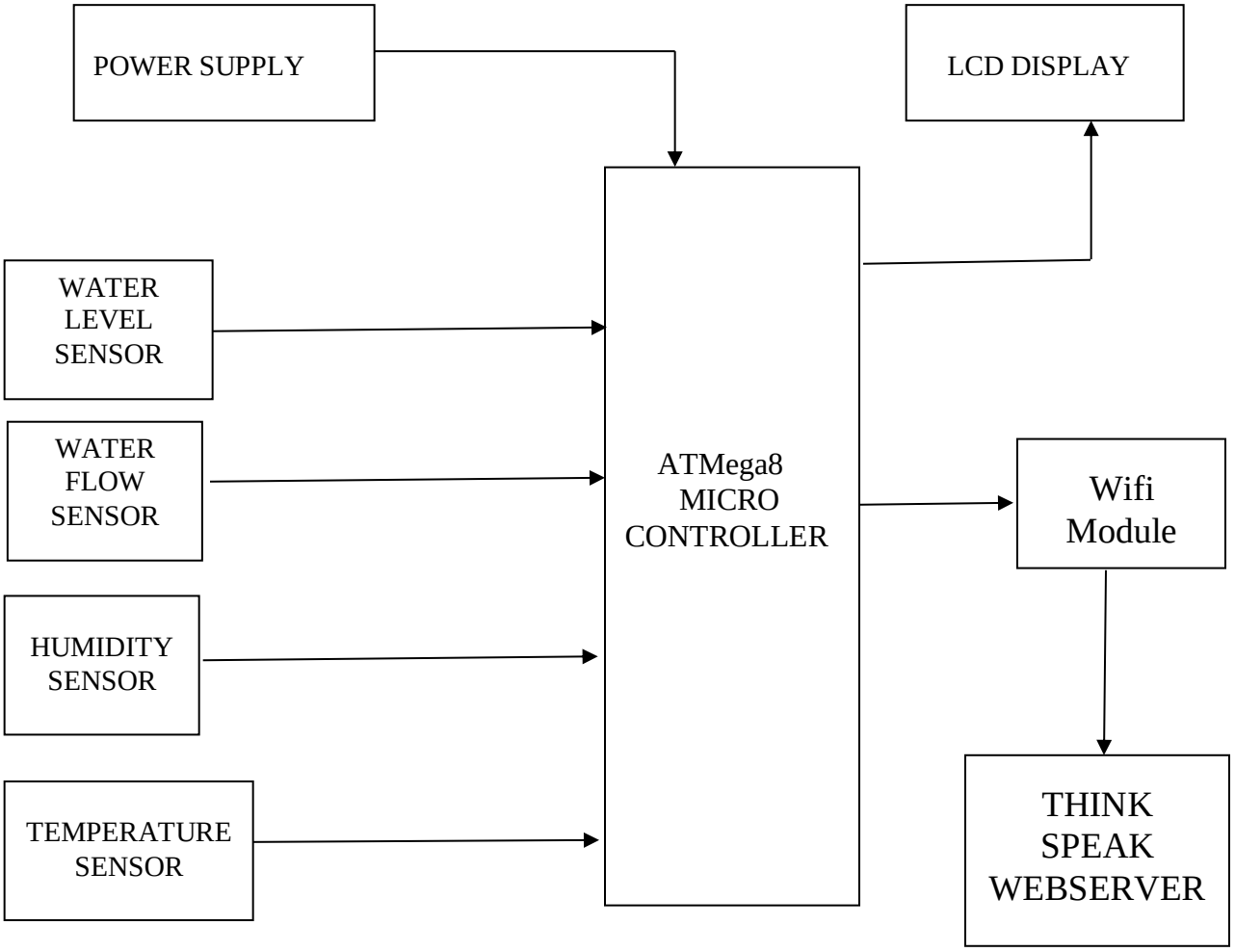
In Recent years flooding became one of the major natural disasters occurring in India. India is among the top 10 in the world's most food-threatened country. There are many effects of floods where the material, human, economic and social losses are considered as some of the main effects of floods. Heavy rains are also one of the major aspects for the causes of flash floods. In order to reduce the human and economic losses there are some necessary steps to be followed. One of the most and the preliminary step is to alert the people before the occurrence of the disaster. There are some places with early flood alert systems but most of them are not most efficient as they can usually send the information to only some respective organizations with limiting distances.

So, in case of floods it is taking more time for passing the message to the people living in the nearby areas so that the people could not save most of their belongings as water rises rapidly within less time. Usually, the flooding cannot be abandoned but the early detections can be made i.e., early alerting system with help of continuous monitoring can be used to reduce the losses faced by the society. In this advanced technology there are some projects related to early flood monitoring system. At the initial stage a project to indicate the level of water and to alert the surrounding people in remote areas using flood observatory system is bought up where the observatory system communicates with the monitoring system via GSM modem in order to send the information of flow rate and to retrieve commands from the monitoring system. Secondly, the flood detections which estimates the instantaneous water level at any instant of time by means of wireless sensor networks and provides GSM modem and then sends the notifications through the social networks such as the Facebook and

Twitter. Thirdly, the real-time flood monitoring system using wireless sensor networks are introduced which monitors the altering and real-time data of river conditions.

3. BLOCK DIAGRAM

3.1 Block Diagram



3. BLOCK DIAGRAM DESCRIPTION

The Figure 1 shows the block diagram of the riverside flood monitoring system. In this project we are using two sensors to find out the two different parameters. One is ultrasonic sensor which is used to find the water level of a river and other is water flow sensor which is used to determine the flow rate of the river. For sending the SMS to local peoples to alert the situation during flood times we are using IFTTT web server. For monitoring the data of these two parameters we are using an external web server named as Thingspeak.

Water Flow Sensor:

Water flow sensor is used to find the water flow rate and we can find the quantity of water that is flowing through river. It consists of 3 pins. VCC, GND and Data pin. It requires 5V to operate. The Data pin is connected to the microcontroller. When water flows into the sensor then the force of the water will rote the wheel which is placed inside of the sensor. The water flow rate can be found by calculating the number of rotations that wheel has done.

Temperature Sensor

A temperature sensor perceives the hotness and the coldness of the environment. The recognizing of the temperature can be done with the straight contact or an indirect contact.

Humidity Sensor

A humidity sensor (or hygrometer) senses, measures and reports both moisture and air temperature. The ratio of moisture in the air to the highest amount of moisture at a particular air temperature is called relative humidity. Relative humidity becomes an important factor when looking for comfort. Humidity sensors work by detecting changes that alter electrical currents or temperature in the air.

Level Sensor

Level sensors are used for the measurement of the water level. Such substances can be liquids like water, oil, slurries as well as solids which can flow.

LCD display

An LCD (Liquid Crystal Display) screen is an electronic display module and has a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. The 16 x 2 intelligent alphanumeric dot matrix display is capable of displaying 224 different characters and symbols. This LCD has two registers, namely, Command and Data. Contrast of the display can be adjusted by adjusting the potentiometer to be connected across VEE pin.

Microcontroller Section:

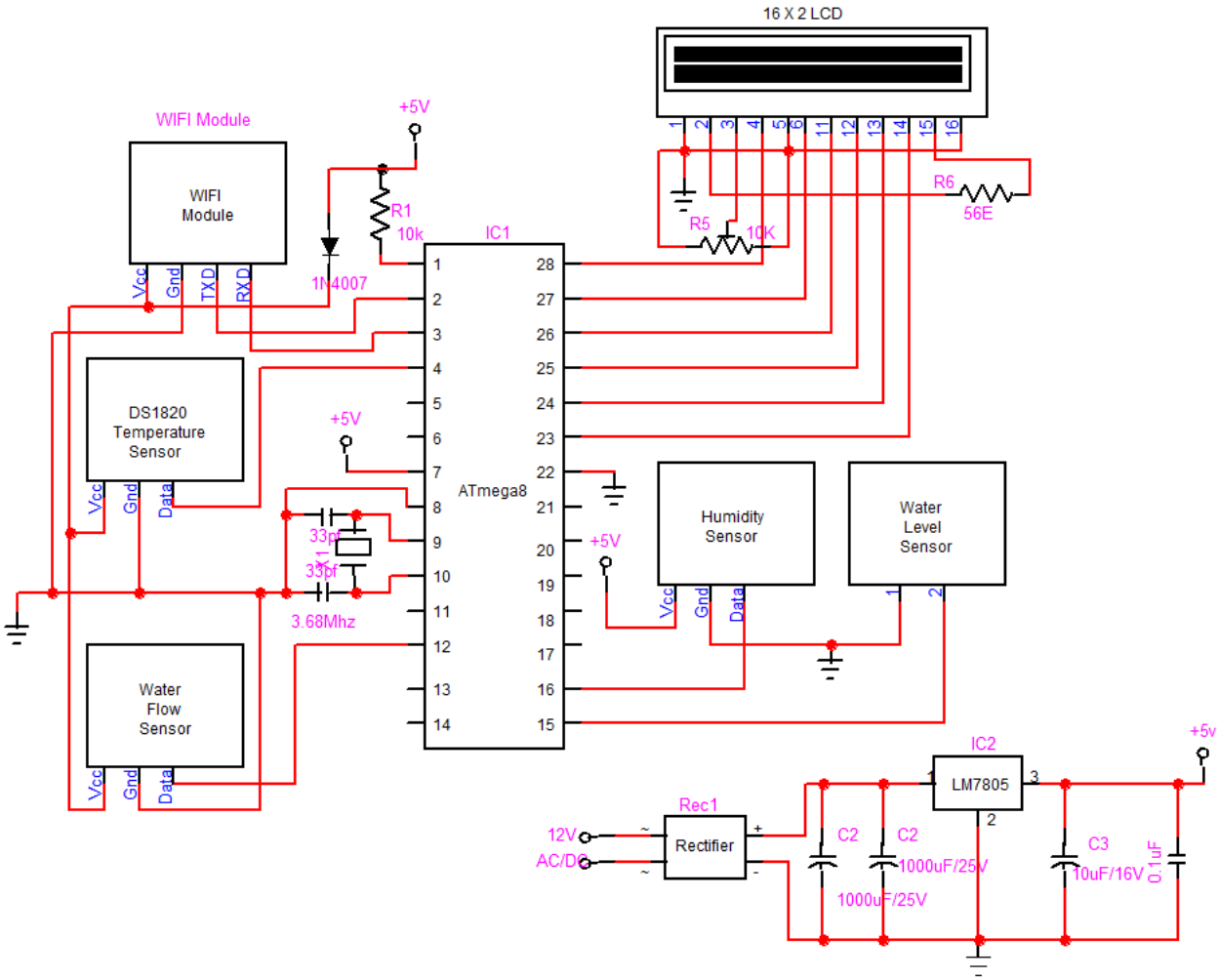
This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it monitors the sensors and update the values the web through the wifi module.

Thingspeak web server:

Thingspeak is an open source IoT application and API to peruse and compose the information from things. It utilizes HTTP convention to communicate. In thingspeak we use the graphs as well as numerical display to monitor the data which is updated from sensor via internet. Thingspeak has many advantages like triggering the certain link if certain conditions are meeting.

4. CIRCUIT DIAGRAM

4.1 MAIN CIRCUIT DIAGRAM



5. **CIRCUIT DIAGRAM DECRIPTION**

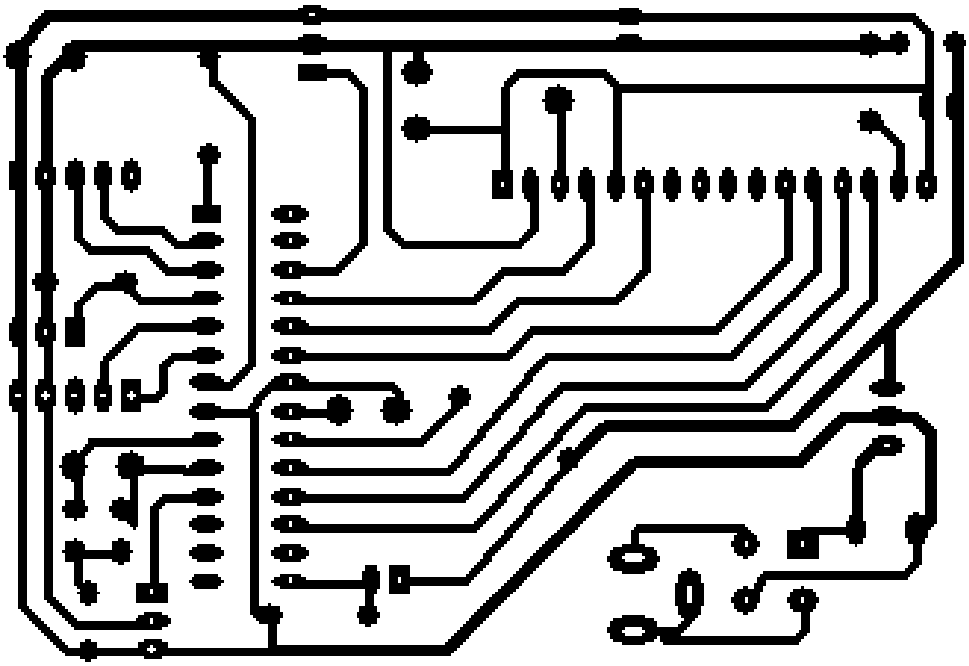
For measuring the water level, we are using level sensor. This sensor uses magnetic sensor to send the level of water. For calculating the water flow rate, we are using water flow sensor, its operating flow rate is0L/min to 50L/min. So, this sensor is sufficient to calculate the flowrate of a river. For processing of the data, we are using Atmega8 microcontroller. The humidity sensor produce dc voltage with respect to the humidity. The atmega8 has inbuilt ADC so that it can easily read the sensor values.

DS1820 is a temperature sensor IC which can sense upto 120 degree Celsius. It has inbuilt adc and so that microcontroller can read the values digitally. All the status are display over the LCD display. The flow sensor is a device for observing the rate of fluid flow. Regularly a flow sensor is the sensing element used in a flow meter for the footage of the flow rate.

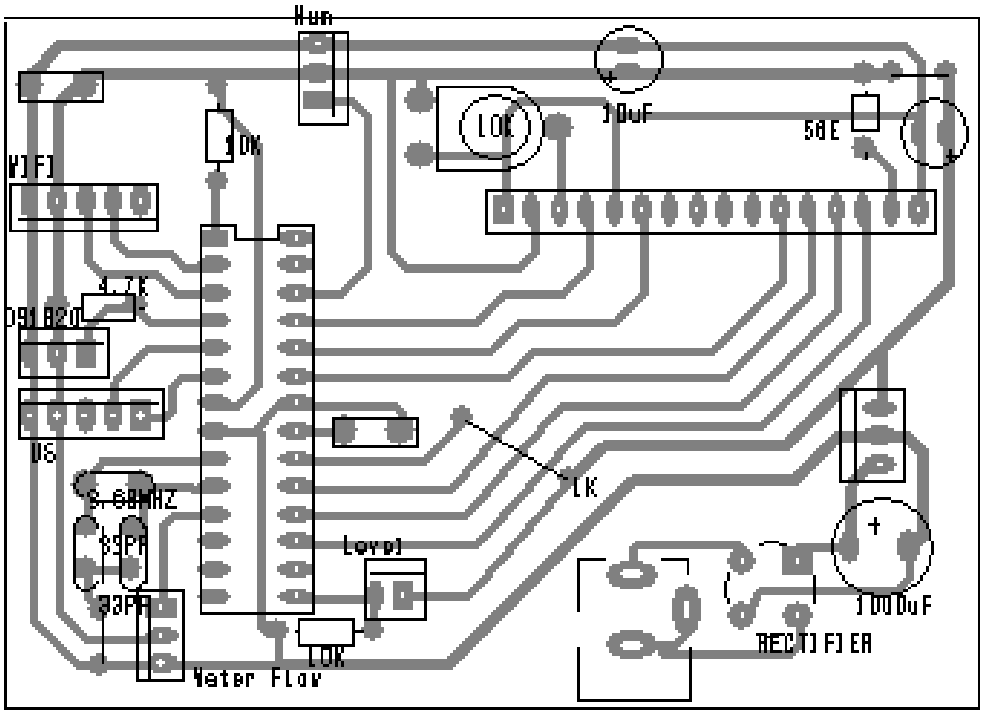
For web access we use ESP8266 wifi module which connects to the internet through wifi. The fetched datas are updated to the web for every minute.

PCB DETAILS

PCB LAYOUT



COMPONENT LAYOUT



PCB Design

The PCB design starts right from the selection of the laminates .The two main types of base laminate are epoxy glass and phenolic paper laminates are generally used for simple circuits. Though it is very cheap and can easily be drilled, phenolic paper has poor electrical characteristics and it absorbs more moisture than epoxy glass. Epoxy glass has higher mechanical strength.

The important properties that have to be considered for selecting the PCB substrate are the dielectric strength ,insulation resistance, water absorption property, coeff. of thermal expansion ,shear strength, hardness, dimensional stability etc.

Manufacturing Process

The steps involved in manufacture are

a) Art work preparation .

b) Resist preparation .

c) Resist application an fixing .

d) Acid etch.

e) Cleaning and inspection.

f) Resist removal.

PCB Fabrication

The fabrication of a PCB basically of four steps.

a) Preparing the PCB pattern .

b) Transferring the pattern onto the PCB.

c) Developing the PCB.

d) Finishing (i.e) drilling, cutting, smoothing, turning etc.

Pattern designing is the primary step in fabricating a PCB in this step, all interconnection between the components in the given circuit are converted into PCB tracks several factors such as positioning ,the diameter of holes ,the area that each component would occupy ,the type of end terminal should be considered.

Transferring the PCB Pattern

The copper side of the PCB should be thoroughly cleaned with the help of alcoholic spirit or petrol must be completely free from dust and other contaminants.

The mirror image of the pattern must be carbon copied and to the laminate the complete pattern may now be made each resistant with the help of paint and thin brush.

Developing

In this developing all excessive copper is removed from the board and only the printed pattern is left behind. About 100ml of tape water should be heated to 75 ° C and 30.5 grams of $FeCl_3$ added to it, the mixture should be thoroughly stirred and a few drops of HCl may be added to speed up the process.

The board with its copper side facing upward, should be placed in a flat bottomed plastic tray and the aqueous solution of $FeCl_2$ poured in the etching process

would take 40 to 60 min to complete.

After etching the board it should be washed under running water and then held against light .the printed pattern should be cleanly visible. The paint should be removed with the help of thinner.

Finishing Touches

After the etching is completed ,hole of suitable diameter should be drilled ,then the PCB may be tin plated using an ordinary 35 Watts soldering rod along with the solder core ,the copper side may be given a coat of varnish to prevent oxidation.

Drilling

Drills for PCB use usually come with either a set of collects of various sizes or a 3-Jaw chuck. For accuracy however 3-jaw chunks aren't brilliant and small drill below 1 mm from grooves in the jaws preventing good grips.

Soldering

Begin the construction by soldering the resistors followed by the capacitors and the LEDs diodes and IC sockets. Don't try soldering an IC directly unless you trust your skill in soldering. All components should be soldered as shown in the figure. Now connect the switch and then solder/screw if on the PCB using multiple washers or spaces. Soldering it directly will only reduce its height above other components and hamper in its easy fixation in the cabinet. Now connect the battery lead.

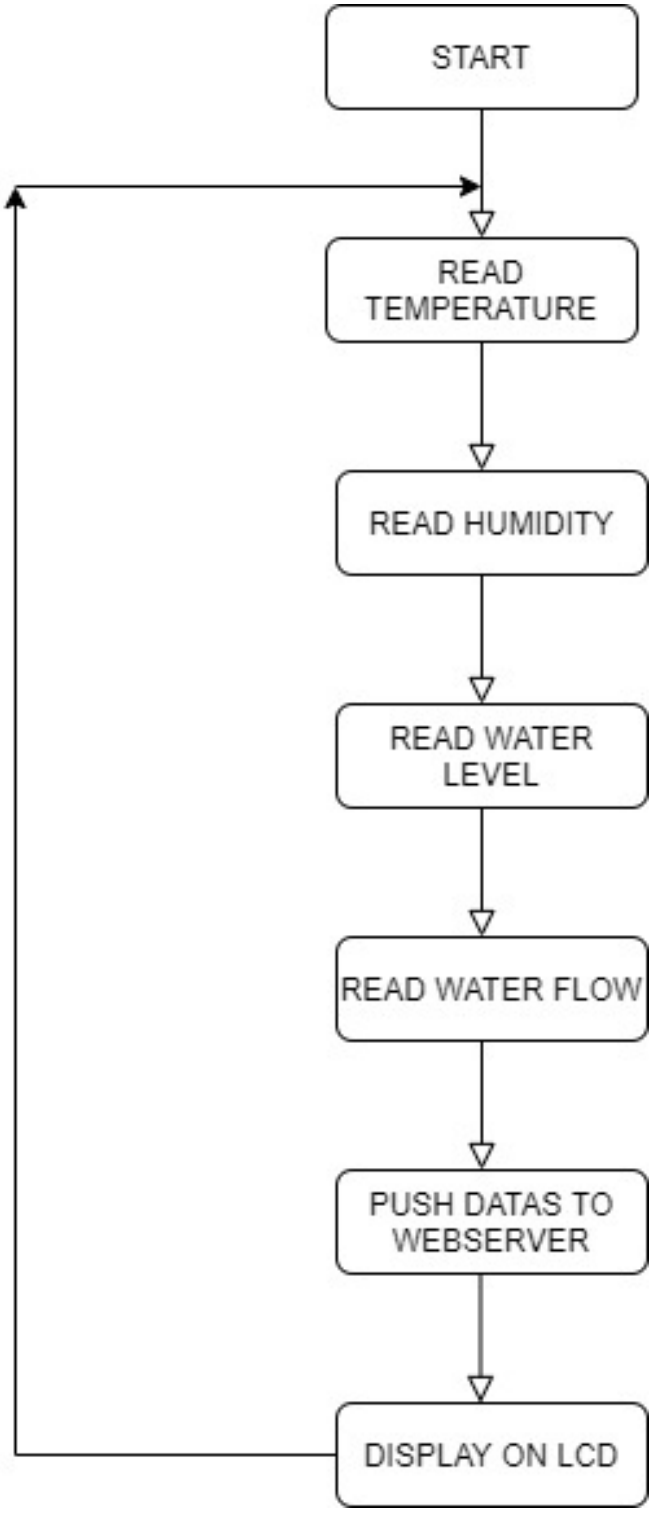
Assembling

The circuit can be enclosed in any kind of cabinet. Before fitting the PCB suitable holes must be drilled in the cabinet for the switch, LED and buzzer. Note that a rotary switch can be used instead of a slide type.

Switch on the circuit to be desired range. It will automatically start its timing cycles. To be sure that it is working properly watch the LED flash. The components

are selected to trigger the alarm a few minutes before the set limit.

6. FLOW CHART



PROGRAM

```
$regfile = "m8def.dat"
$crystal = 3686400
$baud = 115200

$hwstack = 64
$swstack = 64
$framesize = 64

'Config Portb = Output
'Config Portc = Output
'Config Portd = Output
Config Adc = Single , Prescaler = Auto , Reference = AVCC
Config Lcdpin = Pin , Db4 = Portc.0 , Db5 = Portb.5 , Db6 = Portb.4 , Db7 = Portb.3
, E = Portc.1 , Rs = Portc.2
Config Lcd = 16 * 2                    'configure lcd screen
'The prescaler divides the internal clock by 2,4,8,16,32,64 or 128
'Because the ADC needs a clock from 50-200 KHz
'The AUTO feature, will select the highest clockrate possible
Config 1wire = Portd.2

Config Pinb.1 = Input

level_sen Alias Pinb.1


Declare Sub Read1820
Config Timer1 = Timer , Prescale = 8 , Capture Edge = Rising, Noice Cancel = 1
On Capture1 Isr_cap1
On Ovf1 Isr_ovf1
'#####################################

Dim Gps1 As Byte
Dim Clks_per_min As Long
Dim Overflow As Long
Dim Clks_cntd As Long
Dim Rpm As Long
Dim T1overflow_ctr As Byte
dim rpm_temp as byte
```

```
'RPM variables
Dim T1capture As Word , Oldcount As Word
Dim T1 As Integer
Dim Bd(9) As Byte
dim j as byte
'Temp variables
Dim Bd1 As Byte
Dim Bd2 As Byte
Dim Bd7 As Byte
Dim Bd8 As Byte
dim iotcount as byte
dim humidity as byte
dim wifistatus as byte
dim temps as byte

dim tempss as byte
dim level as byte
dim pressure_t as integer
dim Rx_timeout as integer

   Cls                                   'Clear display
   Cursor Off                                'set cursor position
   Lcd "   IOT Flood"
   Lowerline
   Lcd "   Detection"
   Wait 2

wifistatus= 0
Enable Capture1
Enable Ovf1
On Urxc Getchar_wifi
Enable Urxc
Enable Interrupts
Start Adc
Clks_per_min = 460800 * 60         ' clock freq = crystal freq / prescale *60
Clks_cntd = 1                      ' just make sure we never divide by 0
call Read1820
iotcount = 15
Do
```

```
  pressure_t = Getadc(3)

    If T1capture <> Oldcount Then   ' only update if the data is new
       Oldcount = T1capture         ' get the counted pulses
       Clks_cntd = Oldcount         ' put into 32 bit variable
       'Lcd Overflow
       Overflow = Overflow * 65536  ' any over flow
       'Lcd Clks_cntd
       Clks_cntd = Clks_cntd + Overflow       'add overflow to counted pulses
       'Lcd Clks_cntd
       Rpm = Clks_per_min / Clks_cntd
       Rpm = Rpm / 7.5
       rpm_temp = 0
       'Waitms 255                  ' only check 4 times per second
     else
       incr rpm_temp
     End If
  '   print "OF:" ; Overflow ; " CC:" ; Clks_cntd  ; " CC+:" ; Clks_cntd  ; " RPM:" ;
rpm
  '   print "T1:" ; T1capture ; " OC:" ; Oldcount
     if rpm_temp  > 3 then
       rpm_temp = 8
       Rpm = 0
     end if

     call Read1820



     if level_sen = 0 then
       level = 1
     else
       level = 0
     end if

     if pressure_t > 250 then
       tempss= Rnd(6)
       if tempss = 1 then
         humidity = 68
       elseif tempss = 2 then
```

```
      humidity = 69
    elseif tempss = 3 then
      humidity = 68
    elseif tempss = 4 then
      humidity = 70
    elseif tempss = 5 then
      humidity = 69
    else
      humidity = 68
    end if
else
    humidity = 0
end if

cls
lcd "F:" ; Rpm ; "L/hr T:" ; T1
lowerline
lcd "H:" ; humidity ; "% L:"
if level = 1 then
   lcd "HIGH"
else
   lcd "NORMAL"
end if

if wifistatus = 1 then
    locate 2,16
    lcd "^"
end if


wait 1

if wifistatus = 1 then
   incr iotcount
   if iotcount >= 30 then
      iotcount = 0
      cls
      lcd "Pushing data.."
      'lowerline
      'lcd str(T1) ; "," ; str(humidity) ; "," ; str(level) ; "," ; str(Rpm)
```

```
          print T1 ; "," ; humidity ; "," ; level ; "," ; Rpm
          waitms 500
        end if
      end if
      if iotcount >= 200 then
        iotcount = 0
      end if

Loop

'--------------------------------------------------------------------------
' Interrupt routines
' first save the counter value and reset counter
' then save the overflow count and reset it
'--------------------------------------------------------------------------
Isr_cap1:
   T1capture = Capture1            ' get the value in the timer
   Timer1 = 0                      ' clear the timer value
   Overflow = T1overflow_ctr       ' get the overflowcounter value
   T1overflow_ctr = 0              ' reset overflow counter
Return

Isr_ovf1:
   Incr T1overflow_ctr             ' increment our counter
Return

'#############################################################
'     Wifi Interrupt routine
'#############################################################
Getchar_wifi:
Rx_timeout = 0
Do
    Gps1 = Inkey()
    If Gps1 > 0 Then
       if Chr(gps1) = "C" then
          wifistatus = 1
          iotcount = 30
          cls
          lcd "Wifi Connected.."
          waitms 500
```

```
      elseif Chr(gps1) = "A" then
        wifistatus = 0
        cls
        lcd "Waiting for Wifi"
        waitms 500
      elseif Chr(gps1) = "S" then
        cls
        lcd "Pushed"
        lowerline
        lcd "sucessfully..."
        waitms 500
      end if
      Exit Do
    End If
    Incr Rx_timeout
    If Rx_timeout > 500 Then                    'You will have to adjust this value
      Exit Do
    End If
 Loop
Return
'@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
@@@@@@@@@@@@@

'Read the DS1820
Sub Read1820
1wreset                                    ' reset the bus
1wwrite &HCC : 1wwrite &H44                     ' start measure
  Waitms 500                                ' wait for end of conversion
' reads sensor ans calculate                        ' T for 0.1 C
   1wreset                                  ' reset the bus
  1wwrite &HCC                                ' read internal RAM
  1wwrite &HBE                                ' read 9 data bytest
' read 9 data bytest
  Bd(1) = 1wread(9)
  Bd1 = Bd(1)
  Bd2 = Bd(2)
                              ' read bytes in array
  T1 = Makeint(bd1 , Bd2)                        'store decimal number
  T1 = T1 / 16
```

End sub

7. COMPONENT DETAILS

Sl. No	Component Name	Number	Quantity
1.	Microcontroller	ATmega8	1
2.	Temp sensor	DS1820	1
3.	LCD display	16x2	1
4.	Humidity sensor	DHT11	1
5.	Waterflow sensor	-	1
6.	Waterlevel sensor	-	1
7.	Rectifier	-	1
8.	Capacitor	-	5
9.	Resistor	-	10
10.	Crystal	12MHZ	1
11.	Power adapter	12V/2A	1
12.	Wifi module	Nodemcu	1
13.	Transformer	12V	1
14.	Preset	10k	1
15.	PCB Designing	-	1
16.	PCB Manufacturing		-
17	Microcontroller		-

18.	programming		-

8. COMPONENT DESCRIPTION

8.1. INTEGRATED CIRCUITS

MICROCONTROLLER ATMEGA8

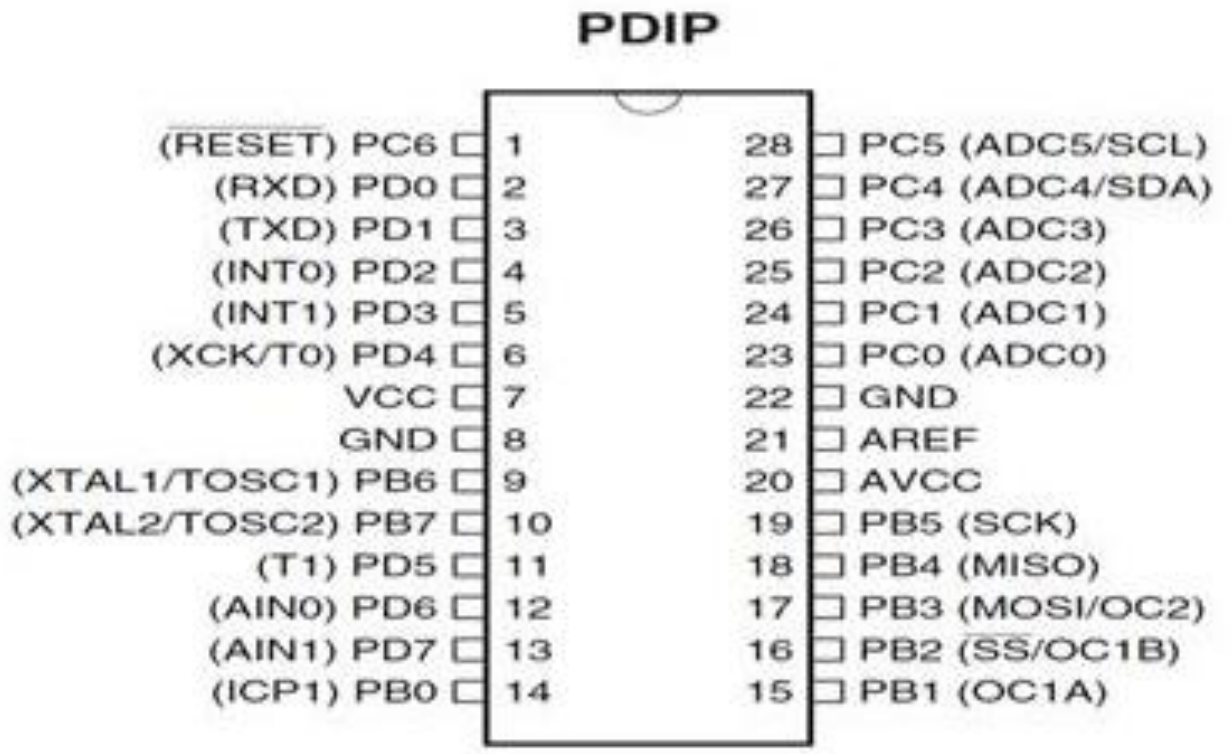
- Compatible with MCS®-51 Products
- 8K Bytes of In-System Programmable (ISP) Flash Memory
    - – Endurance: 1000 Write/Erase Cycles
- 4.0V to 5.5V Operating Range
- Fully Static Operation: 0 Hz to 33 MHz
- Three-level Program Memory Lock
- 256 x 8-bit Internal RAM
- 32 Programmable I/O Lines
- Three 16-bit Timer/Counters
- Eight Interrupt Sources
- Full Duplex UART Serial Channel
- Low-power Idle and Power-down Modes
- Interrupt Recovery from Power-down Mode
- Watchdog Timer
- Dual Data Pointer
- Power-off Flag
- Fast Programming Time
- Flexible ISP Programming (Byte and Page Mode)

DESCRIPTION:

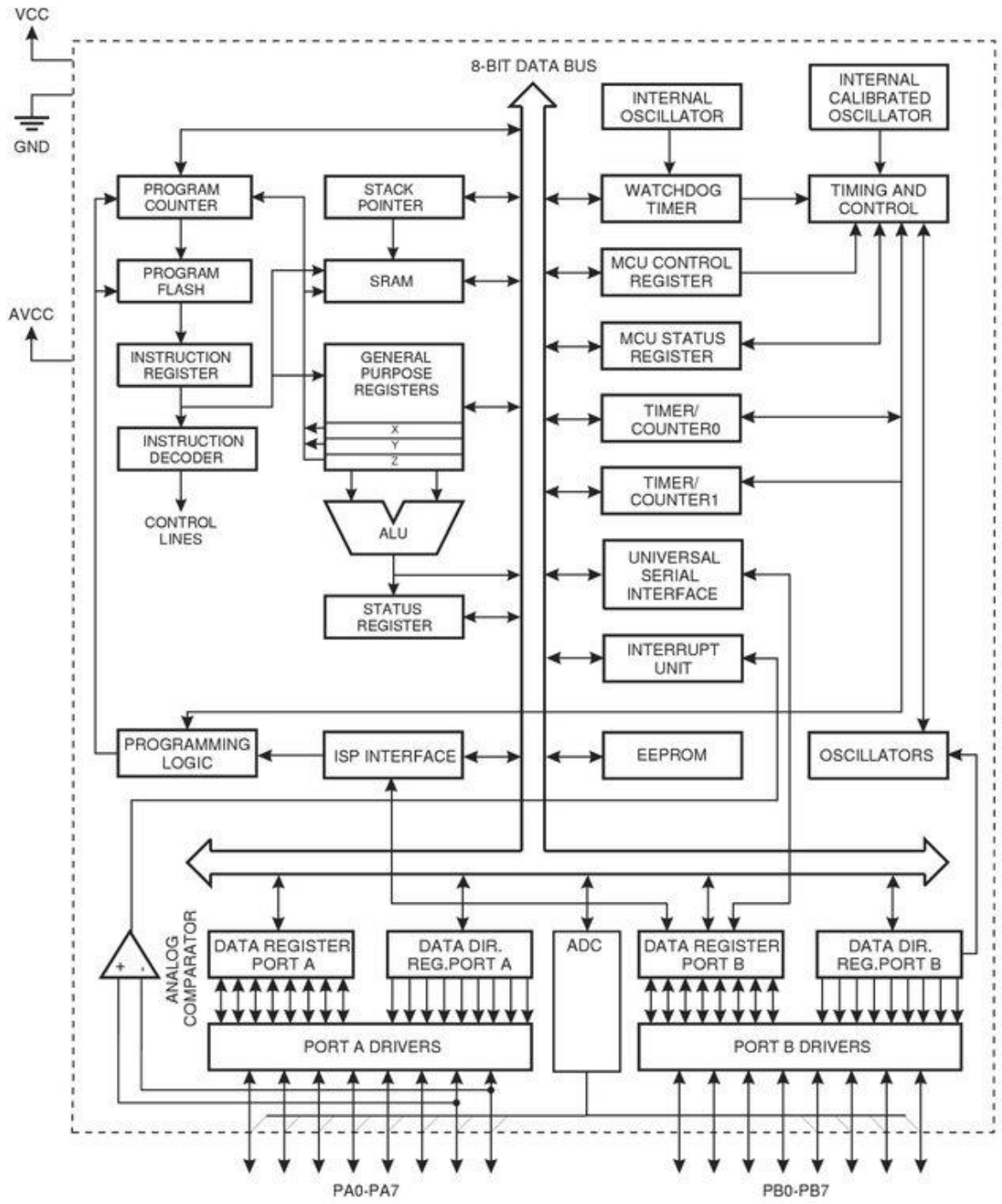
The ATMEGA8 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry- standard 80C51 instruction set and pinout. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel ATMEGA8 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.

The ATMEGA8 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the ATMEGA8 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next interrupt or hardware reset.

PIN DIAGRAM OF
MICROCONTROLLER
ATMEGA8



BLOCK DIAGRAM OF MICROCONTROLLER ATMEGA8



Pin Description of ATMEGA8

VCC

Supply voltage.

GND

Ground.

Port 0

Port 0 is an 8-bit open drain bidirectional I/O port. As an output port, each pin can sink eight TTL inputs. When 1s are written to port 0 pins, the pins can be used as high-impedance inputs. Port 0 can also be configured to be the multiplexed low-order address/data bus during accesses to external program and data memory. In this mode, P0 has internal pull-ups.

Port 0 also receives the code bytes during Flash programming and outputs the code bytes during program verification. External pull-ups are required during program verification.

Port 1

Port 1 is an 8-bit bidirectional I/O port with internal pull-ups. The Port 1 output buffers can sink/source four TTL inputs. When 1s are written to Port 1 pins, they are pulled high by the internal pull-ups and can be used as inputs. As inputs, Port 1 pins that are externally being pulled low will source current (IIL) because of the internal pull-ups.

In addition, P1.0 and P1.1 can be configured to be the timer/counter 2 external count input (P1.0/T2) and the timer/counter 2 trigger input (P1.1/T2EX), respectively, as shown in the following table.

Port Pin	Alternate Functions
P1.0	T2 (external count input to Timer/Counter 2), clock-out
P1.1	T2EX (Timer/Counter 2 capture/reload trigger and direction control)
P1.5	MOSI (used for In-System Programming)
P1.6	MISO (used for In-System Programming)
P1.7	SCK (used for In-System Programming)

Port 1 also receives the low-order address bytes during Flash programming and verification.

Port 2

Port 2 is an 8-bit bidirectional I/O port with internal pull-ups. The Port 2 output buffers can sink/source four TTL inputs. When 1s are written to Port 2 pins, they are pulled high by the internal pull-ups and can be used as inputs. As inputs, Port 2 pins that are externally being pulled low will source current (IIL) because of the internal pull-ups.

Port 2 emits the high-order address byte during fetches from external program memory and during accesses to external data memory that use 16-bit addresses (MOVX @ DPTR). In this application, Port 2 uses strong internal pull-ups when emitting 1s. During accesses to external data memory that use 8-bit addresses (MOVX @ RI), Port 2 emits the contents of the P2 Special Function Register. Port 2 also receives the high-order address bits and some control signals during Flash programming and verification.

Port 3

Port 3 is an 8-bit bidirectional I/O port with internal pull-ups. The Port 3 output buffers can sink/source four TTL inputs. When 1s are written to Port 3 pins, they are pulled high by the internal pull-ups and can be used as inputs. As inputs, Port 3 pins that are externally being pulled low will source current (IIL) because of the pull-ups.

Port 3 receives some control signals for Flash programming and verification.

Port 3 also serves the functions of various special features of the ATMEGA8, as shown in the following table.

Port Pin	Alternate Functions
P3.0	RXD (serial input port)
P3.1	TXD (serial output port)
P3.2	$\overline{\text{INT0}}$ (external interrupt 0)
P3.3	$\overline{\text{INT1}}$ (external interrupt 1)
P3.4	T0 (timer 0 external input)
P3.5	T1 (timer 1 external input)
P3.6	$\overline{\text{WR}}$ (external data memory write strobe)
P3.7	$\overline{\text{RD}}$ (external data memory read strobe)

RST

Reset input. A high on this pin for two machine cycles while the oscillator is running resets the device. This pin drives high for 98 oscillator periods after the Watchdog times out. The DISRTO bit in SFR AUXR (address 8EH) can be used to disable this feature. In the default state of bit DISRTO, the RESET HIGH out feature is enabled.

ALE/PROG

Address Latch Enable (ALE) is an output pulse for latching the low byte of the address during accesses to external memory. This pin is also the program pulse input (PROG) during Flash programming. In normal operation, ALE is emitted at a constant rate of 1/6 the oscillator frequency and may be used for external timing or clocking purposes. Note, however, that one ALE pulse is skipped during each access to external data memory.

If desired, ALE operation can be disabled by setting bit 0 of SFR location 8EH. With the bit set, ALE is active only during a MOVX or MOVC instruction. Otherwise, the pin is weakly pulled high.

Setting the ALE-disable bit has no effect if the microcontroller is in external execution mode.

PSEN

Program Store Enable (PSEN) is the read strobe to external program memory. When the ATMEGA8 is executing code from external program memory, PSEN is activated

twice each machine cycle, except that two PSEN activations are skipped during each access to external data memory.

EA/VPP

External Access Enable. EA must be strapped to GND in order to enable the device to fetch code from external program memory locations starting at 0000H up to FFFFH. Note, however, that if lock bit 1 is programmed, EA will be internally latched on reset. EA should be strapped to VCC for internal program executions. This pin also receives the 12-volt programming enable voltage (VPP) during Flash programming.

XTAL1

Input to the inverting oscillator amplifier and input to the internal clock operating circuit.

XTAL2

Output from the inverting oscillator amplifier.

8.2. LCD DISPLAY

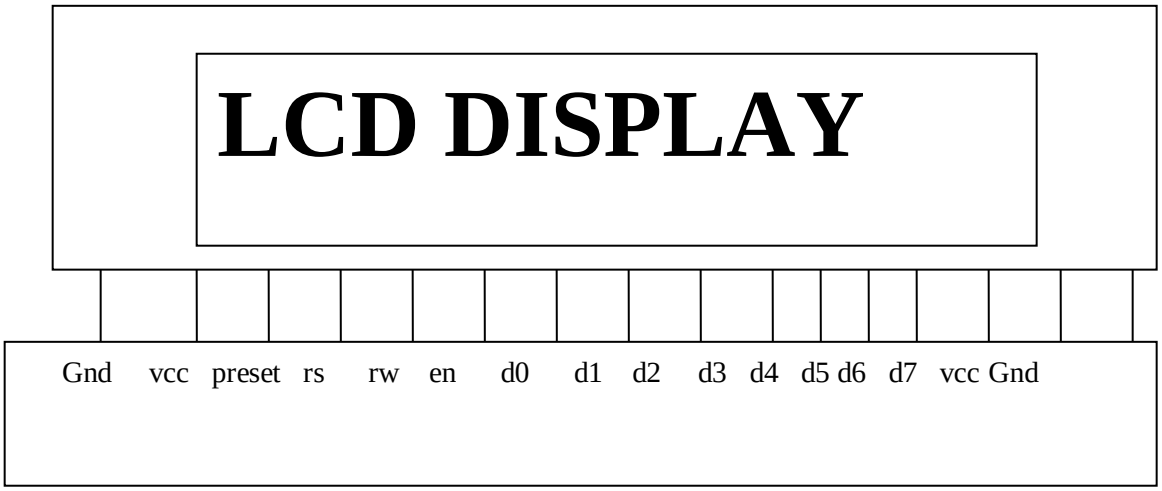
The alphanumeric 16character X 2line LCD requires 8data lines and also 3 control signals. By using 2 ports, port 0&3 data pins are connected to LCD as data bus. Port0 can be basically used as I/O port i.e. it can be programmed as an input or as an output port.

That means if it is programmed as output port, suppose if it is required to read data from LCD immediately it is not possible. Before reading the data it is required to make the port as an input port. Data reading from LCD gives an erroneous reading & should not be implemented. Because of this port5 is made as input / output port depending on the situation. The control signals are connected to port 3 pins. They are EN bar & RS bar, RW bar. At different instance such as data write / command write / data read etc. Various signals are to be provided as indicated by the by the LCD manufacturers.

To interface the LCD, to the Micro controller it require an 8 bit and also three control signals differentiate the data from the control words send to the LCD. The Micro controller has to send the necessary control words followed by the data to be displayed.

Depending on the operation to be performed the control words are selected and passes to the LCD. The data to be displayed on the LCD is to be sent in the ASCII format. Thus all the character to be displayed are converted into ASCII form and then sent to the LCD along with different control words. The control word differentiated the various operations and is executed. It is also possible to read the LCD data if required.

The control signals to the LCD are also provided by the Micro controller. This is also done through pins 3.5,3.6&3.7.Through program necessary control signals are passed to the LCD by using the bits of the port. The remaining can be used for some other purpose if there is a need. The software controls the necessary ports and performs the task it is designed for. The soft ware and associated hardware perform the LCD interface.



8.3. FLOAT SENSOR

There are different types of float sensor are available in market but in this project we used vertical reed float switches. Reed float switches are some of the most prevalent level sensors in common use. Reed switches open or close an electrical circuit based on certain external conditions; in a float switch, this means liquid levels. Reed float switches usually hang vertically in the liquid medium, and come in either “normally open” or “normally closed” position. Both features a glass reed contained within the float, with two metal prongs that open or close the circuit depending on whether or not they are touching. Magnets outside the glass reed rise and fall with the position of float, Connecting or disconnecting the metal prongs as needed. Normally closed float switches features a completed electrical circuit when the device is in its prone position. Rising liquid levels move the magnets such that the connection is served and the electrical circuit disrupted. This can be useful in application like emergency tank shutoffs. In normally open switches, the magnets bring the metal prone together to complete the electrical circuit, activating any attached electronics.

8.4. WATER FLOW SENSOR

Water flow sensors are installed at the water source or pipes to measure the rate of flow of water and calculate the amount of water flowed through the pipe. Rate of flow of water is measured as liters per hour or cubic meters.

Working Principle

Water flow sensor consists of a plastic valve from which water can pass. A water rotor along with a hall effect sensor is present the sense and measure the water flow.

When water flows through the valve it rotates the rotor. By this, the change can be observed in the speed of the motor. This change is calculated as output as a pulse signal by the hall effect sensor. Thus, the rate of flow of water can be measured.

The main working principle behind the working of this sensor is the Hall effect. According to this principle, in this sensor, a voltage difference is induced in the

conductor due to the rotation of the rotor. This induced voltage difference is transverse to the electric current.

When the moving fan is rotated due to the flow of water, it rotates the rotor which induces the voltage. This induced voltage is measured by the hall effect sensor and displayed on the LCD display. he water flow sensor can be used with hot waters, cold waters, warm waters, clean water, and dirty water also. These sensors are available in different diameters, with different flow rate ranges.

These sensors can be easily interfaced with microcontrollers like Arduino. For this, an Arduino microcontroller board for processing, a Hall effect water flow sensor, a 16×2 LCD display, and Breadboard connecting wires are required. The sensor is placed at the water source inlet or at the opening of the pipe.

The sensor contains three wires. Red wire to connect with supply voltage. Black wire to connect to ground and a yellow wire to collect output from Hall effect sensor. For supply voltage 5V to 18V of DC is required.

8.5. HUMIDITY SENSOR

Humidity sensors are used to measure the humidity values. Relative sensors also measure air temperature. But this type of sensor is not useful for temperatures above 100 degree Celsius. Humidity Sensors are the low cost-sensitive electronic devices used to measure the humidity of the air. These are also known as Hygrometers. Humidity can be measured as Relative humidity, Absolute humidity, and Specific humidity. Based on the type of humidity measured by sensor, these are classified as Relative Humidity sensor and Absolute Humidity sensor.

Based on the parameters used to measure humidity, these sensors are also

classified as Capacitive Humidity Sensor, Resistive Humidity Sensor, and Thermal Conductivity Humidity Sensor.

Some of the parameters to consider while choosing these sensors are the Accuracy, Linearity, Reliability, Repeatability and Response time.

Working Principle of Humidity Sensor

Relative humidity sensors usually contain a humidity sensing element along with a thermistor to measure temperature. For a capacitive sensor, the sensing element is a capacitor. Here the change in electrical permittivity of the dielectric material is measured to calculate the relative humidity values. Low resistivity materials are used for the construction of a Resistive sensor. This resistive material is placed on top of two electrodes. Change in the resistivity value of this material is used to measure the change in humidity.

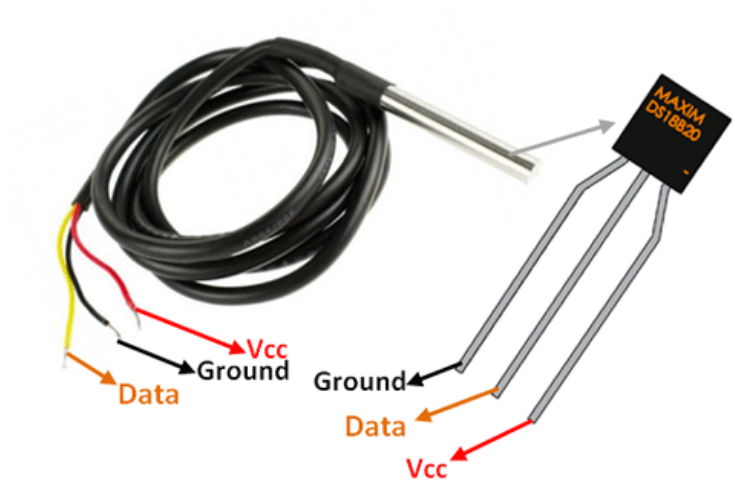
Salt, solid electrolytes and conductive polymers are the examples of resistive material used in Resistive sensor. Thermal conductive sensors measure Absolute humidity values.

8.5. TEMPERATURE SENSOR

The DS18B20 is a 1-wire programmable Temperature sensor from maxim integrated. It is widely used to measure temperature in hard environments like in chemical solutions, mines or soil etc. The constriction of the sensor is rugged and also can be purchased with a waterproof option making the mounting process easy. It can measure a wide range of temperature from -55°C to +125° with a decent accuracy of ±5°C. Each sensor has a unique address and requires only one pin of the MCU to transfer data so it a very good choice for measuring temperature at multiple points without compromising much of your digital pins on the microcontroller.

Pin Configuration

No:	Pin Name	Description
1	Ground	Connect to the ground of the circuit
2	Vcc	Powers the Sensor, can be 3.3V or 5V
3	Data	This pin gives output the temperature value which can be read using 1-wire method



DS18B20 Sensor Specifications

- Programmable Digital Temperature Sensor
- Communicates using 1-Wire method
- Operating voltage: 3V to 5V
- Temperature Range: -55°C to +125°C
- Accuracy: ±0.5°C
- Output Resolution: 9-bit to 12-bit (programmable)
- Unique 64-bit address enables multiplexing
- Conversion time: 750ms at 12-bit
- Programmable alarm options
- Available as To-92, SOP and even as a waterproof sensor

8.6. CAPACITOR

A capacitor is an electrical device for storing electrical energy. The stored electrical energy is released in the form of a current. The capacitor consist of two metallic surface separated by insulator, an insulating material which may be air or liquid or a solid. This insulating material is called the dielectric.

Various types of capacitors used in electronic equipments are named after the dielectric used in their construction like paper capacitor, mica capacitors etc.

The amount of electrical charge that a capacitor can hold depend on its electrical size . This electrical size of a capacitor is called the capacity or capacitance. The unit of capacitance is called a farad(F)

8.7. Resistor

A resistor is an electronic element. It has a known value of resistance. It is specially designed to introduce a desired amount of resistance in a circuit. A resistor is used either to control the flow of current or to produce a desired voltage drop. It is the most common component used in electronic and electric circuits. The unit of resistance is ohm.

The resistor has different types

Fixed category

1. Cracked carbon resistors
2. Wire wound resistors
3. Metal film resistors
4. Metal oxide resistors

Variable category

1. Carbon potentiometers
2. Wire wound potentiometers
3. Precision variable potentiometers

4. Trimming potentiometers

8.8. REGULATOR (LM 7805)

The LM7805 monolithic 3-terminal positive voltage regulators employ internal current-limiting, thermal shutdown and safe-area compensation, making them essentially indestructible. If adequate heat sinking is provided, they can deliver over 1.0A output current.

They are intended as fixed voltage regulators in a wide range of applications including local (on-card) regulation for elimination of noise and distribution problems associated with single-point regulation. In addition to use as fixed voltage regulators, these devices can be used with external components to obtain adjustable output voltages and currents.

Considerable effort was expended to make the entire series of regulators easy to use and minimize the number of external components. It is not necessary to bypass the output, although this improve transient response. Input bypassing is needed only if the regulator is located far from the filter capacitor of the power supply.

9. CONCLUSION

The Flood Observatory System is designed to be an intelligent gadget which is capable of sending real time water level information from a remote location to a monitoring station which could be at a distance away, regardless of time. The Flood Observatory System is a standalone unit which requires no additional devices or system to work with it. The self monitoring in the Flood Observatory System ensures that the system performs efficiently and reliably for the monitoring station. At the event of a system failure, which includes failure in the sensor unit and power supply unit failure will be notified to the monitoring station personnel in real time basis. The Flood Observatory System can be linked to a visual and audio unit to display warnings and alerts the users via text displays or traffic light system in an event of flooding. The implementation cost is invaluable to the efficiency and usefulness of the system towards mankind. The practicality of the system helps to minimize overheads due to floods and also prevents catastrophe at flood prone locations. A system for flood monitoring and alert system was developed especially for critical flood prone remote locations to ensure mankind safety and savings to all sectors.

10. FUTURE ENHANCEMENT

Sensors are important elements in the Flood Observatory System. Further studies on wireless sensor technology will be best to replace the current sensors. Precise and accurate detection of water level will improve the data collection system for the monitoring station. The flood alert information's can be displayed on LED display boards for road users and for safety reasons could be placed at strategic locations. Such information's should be in real time and transmitted wirelessly from the measured location. A possible means of power supply for the sensors and centralized control unit is via solar cells. The Flood Observatory System will be easy to install and maintained if it is powered by solar cells. The use of solar energy will also provide cheaper source of power to the entire system to operate especially if the system is placed in a remote location. For sustainability the circuits and control unit should be designed to consume minimum power during operation.

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